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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,774	02/19/2004	Takashi Shirakawa	023971-0374	2066

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EXAMINER
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NGUYEN, TU MINH

ART UNIT	PAPER NUMBER
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3748

DATE MAILED: 06/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/780,774

Applicant(s)

SHIRAKAWA ET AL.

Examiner

Tu M. Nguyen

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 12, 16, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 8-11, 13-15, 17 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 20040219, 20050427, 20060201.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

1. Claims 1 and 20 are objected to because of the following informalities:
  - Claim 1, line 21 of the claim, -- and-- should be inserted following "therein;"
  - Claim 20, line 9 of the claim, -- comprising-- should be inserted following "rich;"Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 7, 19 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Sawada et al. (U.S. Patent 6,263,667).

Re claims 1, 19, and 20, as shown in Figures 1, 2, 7, and 12, Sawada et al. disclose an exhaust gas purifying apparatus and an exhaust gas purifying method for an internal combustion engine (1), the apparatus comprising:

- an NOx removing catalyst (7) that absorbs nitrogen oxides in an exhaust gas of the engine when an air-fuel ratio of the exhaust gas streaming thereinto is lean and that releases and reduces the absorbed nitrogen oxides therefrom when the air-fuel ratio of the exhaust gas streaming thereinto is rich (lines 56-67 of column 9);

Art Unit: 3748

- an exhaust gas atmosphere varying section (30) that varies a ratio (air-fuel ratio) between an oxidizing agent in the exhaust gas and a reducing agent therein;
- a first exhaust gas atmosphere detecting section (31) disposed in an upstream side of an exhaust passage with respect to the NO<sub>x</sub> removing catalyst to detect the ratio between the oxidizing agent in the exhaust gas and the reducing agent therein;
- a second exhaust gas atmosphere detecting section (33) disposed in a downstream side of the exhaust passage with respect to the NO<sub>x</sub> removing catalyst to detect the ratio between the oxidizing agent in the exhaust gas and the reducing agent therein; and
- an abnormality determining section (30, Figures 7 and 12) that executes an abnormality determination of the NO<sub>x</sub> removing catalyst on the basis of output values of both of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section from a time at which the output value (AFU) of the first exhaust gas atmosphere detecting section is varied to a first predetermined value (RICH, see Figure 2(A)) to a time at which the output value (AFD) of the second exhaust gas atmosphere detecting section is reached to a second predetermined value (RICH, see Figure 2(B)) when the exhaust gas atmosphere varying section increases the ratio of the reducing agent in the exhaust gas.

Re claim 2, in the apparatus of Sawada et al., the abnormality determining section calculates (in step 725) an integration quantity (CATDOR) with respect to time of a difference (TSTR) between the output values (RICH versus STOICHIOMETRIC) of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section and executes (in step 1207) the abnormality determination of the NO<sub>x</sub> removing catalyst on the basis of the calculated integration quantity of the difference.

Art Unit: 3748

Re claim 3, in the apparatus of Sawada et al., each of the first exhaust gas atmosphere detecting section (31) and the second exhaust gas atmosphere detecting section (33) detects an oxygen concentration in the exhaust gas.

Re claim 4, in the apparatus of Sawada et al., each of the first exhaust gas atmosphere detecting section (31) and the second exhaust gas atmosphere detecting section (33) detects an air-fuel ratio of the exhaust gas.

Re claim 7, in the apparatus of Sawada et al., the first exhaust gas atmosphere detecting section comprises an upstream side oxygen concentration sensor (31) disposed at the upstream side of the exhaust passage with respect to the NOx removing catalyst and the second exhaust gas atmosphere detecting section comprises a downstream side oxygen concentration sensor (33) disposed at the downstream side of the exhaust passage with respect thereto and wherein the abnormality determining section executes the abnormality determination of the NOx removing catalyst for an interval of time (TSTR) at which the output value of the downstream side oxygen concentration sensor is maintained within a predetermined range in the vicinity to a stoichiometric air-fuel ratio when the exhaust gas atmosphere varying section increases the ratio of the reducing agent in the exhaust gas, as clearly shown in Figures 2(A) and 2(B).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sawada et al. as applied to claim 4 above, in view of Bidner et al. (U.S. Patent 6,763,656).

The apparatus of Sawada et al. discloses the invention as cited above, however, fails to disclose that instead of an oxidant storage amount in the NOx catalyst, the abnormality determining section calculates an extra HC quantity in the exhaust gas on the basis of the detected exhaust gas air-fuel ratio and an intake fresh air quantity.

As shown in Figure 1, Bidner et al. disclose an air-fuel ratio control for an internal combustion engine having a NOx trap (36), an upstream oxygen sensor (38), and a NOx sensor (40). As depicted in Figures 8 and 9 and indicated in claims 1 and 3, Bidner et al. teach that it is conventional in the art to compute an extra HC amount in the exhaust gas on the basis of the detected exhaust gas air-fuel ratio and an intake fresh air quantity. And a NOx purge of the NOx trap is terminated a difference between the extra HC amount in the exhaust gas at the upstream side of the NOx trap and the extra HC amount in the exhaust gas at the downstream side of the NOx trap exceeds a threshold value. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Bidner et al. in the apparatus of Sawada et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sawada et al. as applied to claim 1 above, in view of Surnilla et al. (U.S. Patent 6,477,832).

The apparatus of Sawada et al. discloses the invention as cited above, however, fails to disclose that the abnormality determining section suspends the abnormality determination of the

Art Unit: 3748

NOx removing catalyst when at least one of the first exhaust gas atmosphere detecting section (31) and the second exhaust gas atmosphere detecting section (33) is deemed to be deteriorated such that the difference of the output values of the first exhaust gas atmosphere detecting section and the second exhaust gas atmosphere detecting section is larger than a third predetermined value when the output value of the second exhaust gas atmosphere detecting section is reached to the second predetermined value.

As shown in Figure 1, Surnilla et al. disclose an air-fuel ratio control for an internal combustion engine having a NOx trap (72), an upstream oxygen sensor (76), and a NOx sensor (140). As depicted in Figure 13, Surnilla et al. teach that it is conventional in the art to suspend an air-fuel ratio control when a difference of output values of the oxygen sensor and the NOx sensor exceeds a predetermined value (step 1414 with Yes answer) when the output value of the NOx sensor indicates that a NOx purge is on going (step 1410 with Yes answer). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Surnilla et al. in the apparatus of Sawada et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sawada et al. as applied to claim 4 above, in view of official notice.

In the apparatus of Sawada et al., the first and second exhaust gas atmosphere detecting sections comprise an upstream side lambda sensor (31) and a downstream side lambda sensor (33), respectively. Sawada et al., however, fail to disclose that the apparatus further comprises an excess air ratio calculating section that calculates an upstream side excess air ratio at the upstream side of the NOx removing catalyst on the basis of a pump current value of the

Art Unit: 3748

upstream side lambda sensor and calculates a downstream side excess air ratio at the downstream side of the NOx removing catalyst on the basis of the pump current value of the downstream side lambda sensor.

It is well known to those with ordinary skill in the art that a means to compute an oxidant amount is by calculating an excess air ratio based on a pump current value of a lambda sensor. Therefore, such disclosure by Sawada et al. is notoriously well known in the art so as to be proper for official notice.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sawada et al. in view of Bidner et al. as applied to claim 5 above, and further in view of official notice

The modified apparatus of Sawada et al. discloses the invention as cited above, however, fails to disclose the procedure to calculate an extra HC quantity in the exhaust gas on the basis of the detected exhaust gas air-fuel ratio and an intake fresh air quantity.

It is well known to those with ordinary skill in the art that an intake air quantity is calculated based on a cylinder volume ratio, a volumetric efficiency corresponding value, and an engine collector inlet fresh air rate; and that a means to compute an excess HC amount downstream of the catalyst is by calculating HC amounts at an upstream location and a downstream location of the NOx catalyst; wherein the HC amount is based on an excess air ratio and an intake air quantity. Therefore, such disclosure by Sawada et al. is notoriously well known in the art so as to be proper for official notice.



***Allowable Subject Matter***

9. Claims 8-11, 13-15, 17, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Prior Art***

10. The IDS (PTO-1449) filed on February 19, 2004, April 27, 2005, and February 1, 2006 have been considered. An initialized copy of each is attached hereto.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of four patents: Surnilla et al. (U.S. Patent 6,418,711), Hashimoto et al. (U.S. Patent 6,467,256), Takanohashi (U.S. Patent 6,484,493), and Nishioka et al. (U.S. Patent 6,698,187) further disclose a state of the art.

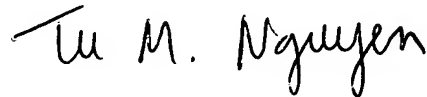
***Communication***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Art Unit: 3748

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TMN

Tu M. Nguyen

June 12, 2006

Primary Examiner

Art Unit 3748